

DECEMBER 2019 Update (3QCY2019)**RF Front Ends for Mobile Devices (RFFE) Forecast****Major changes to the forecast this quarter include:**

1. Q3 saw the normal cycle for the top 3 supplier smartphone releases: Samsung Galaxy Note 10, Apple iPhone 11 and Huawei Mate 30 Pro. Both Samsung and Huawei include a 5G version, but by all accounts acceptance has been very muted. Apple's 5G offering is still widely expected in the 2020 release.
2. Huawei had an interesting quarter. Due to supply chain restrictions, the Mate 30/Mate 30 Pro were released with very few US components; Murata certainly seemed to be a beneficiary at the expense of Skyworks and Qorvo. Despite this, Huawei reported strong handset growth based on an increase in domestic demand. One impact of the disruption to the supply chain might well be the acceleration of alternative sources of RF components that could ultimately extend beyond Huawei. Necessity is a very strong motivation and a prolonged disruption to the historical supply chain will most certainly put a dent in the longer-term market for US component suppliers.
3. Table 1-1: Based on additional dialog with mm-wave component suppliers and handset OEMs, we are seeing improved RF technical solutions to address thermal issues that have hindered initial products. In the near term, it is still our expectation that there will not be a driving motivation for customers to pay a premium for 5G mm-wave technology. However, we acknowledge that there will be handsets in the market, but the uptake will be modest.
4. Table 4-1: We've maintained some strong price erosion in the market, which almost completely offsets content growth during 2019. The RFFE market will grow with 5G handsets in 2020 and beyond, but the short-term growth is weak.
5. Table 4-5: Overall market shares were updated based on quarterly earnings announcements by several vendors.
 - a. Skyworks started shipping into BAW filter applications and reported \$554M for 3Q19 for the mobile market.
 - b. Qorvo reported better numbers than the market expected, \$52M above prior guidance, with \$623M in estimated mobile RFFE revenue.
 - c. Broadcom's wireless appeared to be relatively flat in Q3. As with Q2, we estimate the Broadcom RFFE sales for Q3 at \$700-750M.

- d. Murata is seeing strength in the module category for the Sept quarter, which matches the demand cycle for handset launches in the Fall timeframe. This cycle there is an additional boost as a consequence of the trade restrictions for US components into the China handset OEM market.
- 6. Pages 5-7: Quarterly market shares have been updated for filters, PAs, and modules that constitute the majority of the RFFE market, to match design win info (teardowns) with revenue announcements.